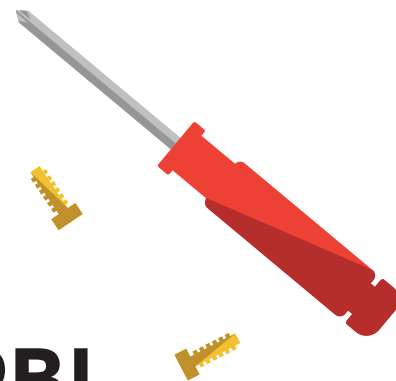


# Engaging All Types of Learners in Collaborative STEAM Experiences with PBL



## IMPACT:

*How students in one high-need district became highly engaged with STEAM, language arts, problem solving, and cooperative learning.*



Reedley, California is home to Kings Canyon Unified School District, a district where 80% of students qualify for free or reduced lunch and 30% are English-language learners. Like most school districts, digital fluency and STEAM education are top-of-mind. Kings Canyon was searching for solutions that could impart these 21st century skills beyond the traditional learning environment to students with all levels of English proficiency.

As a result, Joseph Valero, English Language Development & Migrant Workers Director for Kings Canyon, organized a summer program for the district's highest need students.

Valero's goal was simple but ambitious: improve STEAM learning outcomes for high-needs students... all while limiting the impact on teachers and staff.

For that, he looked to Piper.

Kings Canyon had previously piloted the Piper Computer Kits during a Saturday Enrichment program and Valero was excited to roll it out on a larger scale.

Kings Canyon purchased the Piper Computer Kits for a more widespread integration. The kits teach students to assemble, wire, and code functioning computers while working collaboratively.

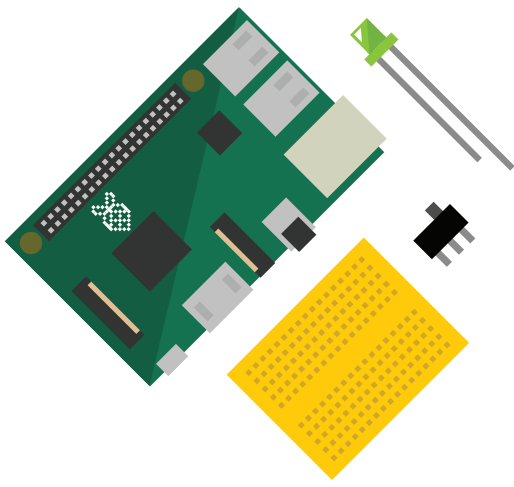
The first step was introducing Piper to the teaching staff through a professional development workshop run by Piper's education team. Many of the Kings Canyon faculty had never taught electronics, computer science, or coding before. In just four hours, the staff became comfortable with both the Piper Kits and teaching STEAM curriculum to all types of learners.

"It was really exciting when we finished putting the Piper (computer kit) together and it turned on," said KCUSD teacher, Gwenn Southerland. "Then we got to do some of the coding where we were giving it commands. I don't have a background in teaching circuits or anything like that. There is a series of red, yellow, and green lights... like a stop light. It was really cool for me because then I started to understand... this is what's taking place in the city. Someone's coding a computer to get these lights to come on."

The teachers' enthusiasm rolled over into the classroom and the students were immediately absorbed in the unique project-based lessons.

*The kids loved it. Absolutely loved it. They told their friends that they need to come to summer school. Really. We had more kids show up either the second or third or fourth day wanting to be part of our program because of Piper," said Southerland.*





The engaging project combined with Piper's student-centered process meant the teaching staff were able to allow each of the student groups to be self-directed and problem solve on their own.

"I was able to just turn the kids loose," said teacher Felicia Loera. "We went over some basics in the beginning -- what's an input, what's an output-- stuff like that, but while they were building the kids picked it up easily."

The hands-on nature of the Piper Computer Kits and its inquiry-based curriculum, developed by STEAM educators, creates an experiential learning environment where kids naturally learn problem solving and collaboration.

"What I really like about Piper as an educator is it forced me to be hands off," said Southerland. "I didn't have the answers for everything. I couldn't tell you what to do. A lot of our kids are used to being given the answers and just doing things by rote. And so it was really wonderful for me to be forced to take a step back and say, 'I don't know. What do you think? What do you want to try?... Well, try that.' If that didn't work, 'Now what are you going to do? What makes sense? Go back to the blueprints.'"

Piper Computer Kits were assembled in student groups of 2 or 3 to encourage communication and collaboration.

"I picked boy-girl pairs," said Loera. "It forced them to work together. They really built a relationship with their partner. Someone they probably wouldn't otherwise talk to, they talked through the problems. And they would watch the other teams and when they saw someone finish, they'd go over and ask, 'how did you do that?'... It really built a team community in the classroom."

Southerland agreed. "We want to encourage students to work together like you do in business, like... in your regular job. I would put two or three students together on one Piper and they had to work together. And then it was really neat for them to realize that they have different strengths."

*Students in the program self-reported a **24% increase** in their ability to collaborate towards a common goal while helping others along the way.*

The collaborative nature of the projects also allowed different learning styles and aptitudes to shine that may not be as identifiable in other educational settings. This was especially true for students with language or reading difficulties.

"Another thing I really, really liked about the directions for students was it was in a blueprint form... like you would see in real life. And there was very little text to actually read. It was all visual and problem solving. So that made it accessible for all the students regardless of their language ability and regardless of their reading comprehension," said Southerland.

"I had one young man who, you know, gets in trouble, even though he's a really good kid. He was just so focused and didn't even look at the blueprints. He took one look at it and just started putting things together and problem solving. He had his Piper built and turned on before anyone else. It allowed him to really shine."

*Overall, Kings Canyon students self-reported that they became **28% more digitally fluent** and had a greater understanding of how everyday devices work after building their Piper Computer Kit.*

### **Additional key findings from the Kings Canyon Outcome Report:**

1. Students showed greater levels of mastery in computer science through metacognition
2. Students displayed more comfort with growth mindset and recognized that cognitive dissonance leads to deeper learning and better outcomes
3. Student increased an aptitude for grit & perseverance after using the Piper Computer Kits
4. Students displayed greater leadership qualities when working with a group on computer science challenges

Valero appreciated the results and positive reactions of the teachers so much that he presented the data and the experience to their school board.

Piper will continue to be used in Saturday Enrichment classrooms and beyond in Kings Canyon Unified Schools.